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## NOTICE OF ALLOWANCE AND FEE(S) DUE

76225 7590 06/25/2010

Gerbera/BSTZ  
Blakely Sokoloff Taylor & Zafman LLP  
1279 OAKMEAD PARKWAY  
SUNNYVALE, CA 94085

EXAMINER

CHOE, YONG J

ART UNIT

PAPER NUMBER

2185

DATE MAILED: 06/25/2010

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/629,093

07/28/2003

Robert J. Royer

8410.P16418

6380

TITLE OF INVENTION: MANAGING A CACHE WITH PINNED DATA

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	09/27/2010

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

### HOW TO REPLY TO THIS NOTICE:

#### I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**

# **PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
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**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

76225 7590 06/25/2010

Gerbera/BSTZ  
Blakely Sokoloff Taylor & Zafman LLP  
1279 OAKMEAD PARKWAY  
SUNNYVALE, CA 94085

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

## **Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/629,093 07/28/2003 Robert J. Royer 8410.P16418 6380

TITLE OF INVENTION: MANAGING A CACHE WITH PINNED DATA

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
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nonprovisional NO \$1510 \$300 \$0 \$1810 09/27/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
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CHOE, YONG J 2185 711-113000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 \_\_\_\_\_
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 \_\_\_\_\_
- 3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s); (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_

Registration No. \_\_\_\_\_

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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10/629,093	07/28/2003	Robert J. Royer	8410.P16418	6380
76225	7590	06/25/2010	EXAMINER	
Gerbera/BSTZ Blakely Sokoloff Taylor & Zafman LLP 1279 OAKMEAD PARKWAY SUNNYVALE, CA 94085			CHOE, YONG J	
			ART UNIT	PAPER NUMBER
			2185	
DATE MAILED: 06/25/2010				

## Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 943 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 943 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

<b>Notice of Allowability</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/629,093	ROYER, ROBERT J.	
	<b>Examiner</b>	<b>Art Unit</b>	
	YONG CHOE	2185	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to amendment filed on 03/11/2010.
2. ☒ The allowed claim(s) is/are 1-21.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
  - \* Certified copies not received: \_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_.

**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |   |
|--|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)   | 5. <input type="checkbox"/> Notice of Informal Patent Application                     |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 6. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date ____. |
| 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date <u>03/11/2010</u> | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment                   |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material                     | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance  |
|  | 9. <input type="checkbox"/> Other ____.   |

/Yong Choe/  
Examiner, Art Unit 2185

### **EXAMINER'S AMENDMENT**

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

### ***Information Disclosure Statement***

2. As required by M.P.E.P. 609 (C), the applicant's submission of the information Disclosure Statement dated 03/11/2010 is acknowledged by the examiner and the cited references have been considered in the examination of the claims now pending. As required by M.P.E.P. 609 C(2), a copy of the PTOL-1449 initialed and dated by the examiner is attached to the instant office action.

### ***Authorization***

3. Authorization for this examiner's amendment was given in a telephone interview with Ryan W. Elliott on 06/07/2010.

### ***Claim Amendments***

4. **Claims 1,6,13,18 and 20** of the application have been amended as follows:

Claim 1. (Currently amended) A method of managing a Constant Access Time Bounded (CATB) cache, the method comprising:

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dividing the cache into a non-zero whole number (N) of search groups, wherein a data element to be inserted into the cache is mapped only to one search group;

reserving a first number of unallocated lines in the cache for pinned data, the first number being less than the number of lines in the cache;

allocating a second number of unallocated lines in the cache to the search groups for non-pinned data, wherein the second number is a number of remaining lines after the first number of lines has been reserved and wherein each search group is allocated a fixed number of lines for non-pinned data; and

inserting the data element into the cache as pinned data, wherein the inserting includes selecting a line from the lines reserved for pinned data, storing the data in the line, and inserting the line of pinned data into a search group of the CATB cache, wherein a constant number of non-pinned lines are maintained within the search group.

Claim 6. (Currently amended) The method of claim 5 wherein:

the CATB cache is implemented as a set-associative cache;

each search group of the cache is a set of the cache; and

inserting the line of pinned data into a search group of the cache further comprises:

using the address of the data as the tag of the line;

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performing a modulus operation between the tag and the ~~number of~~  
N sets (~~N~~) in the cache (the tag MOD N) to map the tag to a set of the  
cache;

performing a search based on the tag of the line; and

inserting the line of pinned data into a dynamic data structure that  
represents the set.

Claim 13. (Currently amended) A non-transitory machine-readable storage  
medium having stored thereon data which when accessed by a machine causes  
the machine to perform a method comprising:

dividing a Constant Access Time Bounded (CATB) cache into a non-zero  
whole number (N) of search groups, wherein a data element to be inserted into  
the cache is mapped only to one search group;

reserving a first number of unallocated lines in the cache for pinned data,  
the first number being less than the number of lines in the cache;

allocating a second number of unallocated lines in the cache to the search  
groups for non-pinned data, wherein the second number is a number of  
remaining lines after the first number of lines has been reserved and wherein  
each search group is allocated a fixed number of lines for non-pinned data; and

inserting the data element into the cache as pinned data, wherein the  
inserting includes selecting a line from the lines reserved for pinned data, storing  
the data in the line, and inserting the line of pinned data into a search group of

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the CATB cache, wherein a constant number of non-pinned lines are maintained within the search group.

Claim 18. (Currently amended) The non-transitory machine-readable storage medium of claim 17 wherein the method further comprises:

- the CATB cache is implemented as a set-associative cache;
- each search group of the cache is a set of the cache; and
- inserting the line of pinned data into a search group of the cache further comprises:
  - using the address of the data as the tag of the line;
  - performing a modulus operation between the tag and the ~~number of~~ N sets ~~(N)~~ in the cache (the tag MOD N) to map the tag to a set of the cache;
  - performing a search based on the tag of the line; and
  - inserting the line of pinned data into a dynamic data structure that represents the set.

Claim 20. (Currently amended) A non-transitory machine-readable storage medium having stored thereon data which when accessed by a machine causes the machine to perform, for a non-zero whole number N, in an N-way set associative non-volatile disk cache, a method comprising:

- dividing the cache into N sets, ~~wherein N is a non-zero whole number,~~
- wherein a data element to be inserted into the cache is mapped only to one set;



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reserving a predetermined number of lines for pinned data and organizing them into a pool of lines for pinned data;

distributing the remaining lines in the cache into N dynamic data structures of approximately the same size to represent the N sets of the cache, wherein each set is allocated a fixed number of lines for non-pinned data;

inserting the data element into the cache as pinned data, wherein the inserting comprises:

inserting the data into a line from the pool for pinned data;

marking the line as allocated by modifying metadata associated with the line;

determining the set to which the line belongs using a mapping based on the tag associated with the line;

removing the line from the pool for pinned data; and

adding the line of pinned data to the set, wherein a constant number of non-pinned lines are maintained within the set.

### ***Reasons of Allowance***

5. **Claims 1-21** are allowed.

6. The following is an examiner's statement of reasons for allowance:

7. **Independent Claims 1 and 13** identify the distinct features, "*allocating a second number of unallocated lines in the cache to the search groups for non-pinned data, wherein the second number is a number of remaining lines after the*

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*first number of lines has been reserved and wherein each search group is allocated a fixed number of lines for non-pinned data; and inserting the data element into the cache as pinned data, wherein the inserting includes selecting a line from the lines reserved for pinned data, storing the data in the line, and inserting the line of pinned data into a search group of the CATB cache, wherein a constant number of non-pinned lines are maintained within the search group”, which are not taught or suggested by the prior art of records.*

**Independent Claims 8 and 20** identify the distinct features, *“distributing the remaining lines in the cache into N dynamic data structures of approximately the same size to represent the N sets of the cache, wherein each set is allocated a fixed number of lines for non-pinned data; inserting the data element into the cache as pinned data, wherein the inserting comprises inserting the data into a line from the pool for pinned data; marking the line as allocated by modifying metadata associated with the line; determining the set to which the line belongs using a mapping based on the tag associated with the line; removing the line from the pool for pinned data; and adding the line of pinned data to the set, wherein a constant number of non-pinned lines are maintained within the set”, which are not taught or suggested by the prior art of records.*

**Independent Claims 10 and 12** identify the distinct features, *“a pinned data portion of the non-volatile memory to store a pool of lines for pinned data; and a pinned data insertion module to insert pinned data into a line from the pool of lines for pinned data; mark the line as being allocated by modifying metadata associated with the line; determine a set to which the line belong using a*

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*mapping based on the tag associated with the line; remove the line from the pool for pinned data; and add the line to the set, wherein a constant number of non-pinned lines are maintained within the set”, which are not taught or suggested by the prior art of records.*

**Claims 1-21** would be allowable over the prior art of records because the claimed features as mentioned above in combination with other claimed features are not taught or suggested by the prior art of records. The above features in conjunction with all other limitations of the dependent and independent claims 1-21 are hereby allowed.

8. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

### **Conclusion**

9. Any inquiry concerning this communication should be directed to **Yong Choe** at telephone number **571-270-1053** or email to **yong.choe@uspto.gov**. The examiner can normally be reached on M-F 9:30am to 6:00pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, **Sanjiv Shah** can be reached on **571-272-4098**. Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 whose telephone number is (571) 272-2100.

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10. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PMR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Yong Choe/  
Examiner, Art Unit 2185